

**Amendments to the Claims:**

Please amend claims 1, 2, and 6 as follows.

Please cancel claims 11, 13, and 15 without prejudice or disclaimer.

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of the Claims**

1. (Currently Amended) In a method of analyzing the production of one or more selected metabolites of a biochemical reaction network producing metabolites, the method having as inputs

reactions of the biochemical reaction network constructed from genomic and biochemical data,

exchange fluxes on such of the produced metabolites as are of interest as inputs and outputs to the network,

a stoichiometric matrix, developed from the reactions and including the exchange fluxes, defining participation of each network metabolite in each reaction and exchange flux of the network, and

a system of linear equations and inequalities mathematically defining the network, the method serving to identify deletion sets of reactions that, when removed from the network, eliminate the capability of the network to produce a selected metabolite, an improvement to the method comprising:

said linear equations and inequalities of the network mathematically forming a convex solution space called a flux cone, calculating generating vectors of the flux cone, which generating vectors are called extreme pathways;

eliminating an internal reaction flux and pathways utilizing the eliminated internal reaction flux, thereby producing an altered network, ~~and~~

determining if said eliminated internal reaction flux diminishes the capability of the network to produce an output metabolite of interest, and

providing an output of said determination to a user or computer memory wherein the  
~~determined~~ reaction fluxes sets ~~determined to~~ diminishing the capability of the network  
correspond to a minimal deletion set which affect the capability of the network to produce the  
output metabolite of interest.

2. (Currently Amended) The method according to claim 1 that, ~~after the determining of sets~~  
~~of reactions~~, further comprises:

selecting from the reaction fluxes determined to diminish the capability of the network  
sets of reactions ~~these sets~~ that totally eliminate the capability of the network to produce the  
output metabolite of interest;

wherein the selected sets are called deletion sets because deletion of the reactions  
represented by the pathways of these sets suffices to totally eliminate the production of the  
output metabolite of interest by the network.

3. (Original) The method according to claim 1 wherein the calculating of the generating  
vectors of the flux cone is by mathematical process of convex analysis.

4. (Original) The method according to claim 3 wherein the mathematical process of  
convex analysis comprises: calculating any of (i) a conical basis, (ii) a convex basis, (iii) a linear  
basis, or (iv) a combination of any of conical and convex and linear bases.

5. (Original) The method according to claim 1  
wherein at least some of the constructed reactions will have an associated constraint upon  
the direction in which the reaction can proceed.

6. (Currently Amended) The method according to claim 1  
wherein an ~~the~~ output of interest consists of one or more functional properties of interest  
~~in the analyzed of said biochemical production reaction network~~;  
wherein the reaction sets show how these one or more functional properties of interest  
can be diminished or eliminated.

7. (Original) The method according to claim 6  
wherein the output of interest consists of one functional property of interest in the  
analyzed biochemical production network;  
wherein the reaction sets show how this functional property of interest can be diminished  
or eliminated.

8. (Previously Presented) The method according to claim 1  
wherein the biochemical reaction network analyzed represents a disease producing,  
pathogenic, organism; and  
wherein the metabolite of interest is necessary for survival of the pathogenic organism;  
and wherein the method further comprises:  
using the reaction set to target development of a drug that, by obstructing those reactions  
of the pathogenic organism that produce the metabolite necessary for survival of the organism,  
serves to eliminate the pathogenic organism.

Claim 9 (Canceled).

10. (Withdrawn) The method according to claim 1  
wherein the biochemical reaction network analyzed represents a disease producing,  
pathogenic, organism; and  
wherein the metabolite of interest, produced by the pathogenic organism, is deleterious,  
inducing disease; and wherein the method further comprises:  
using the reaction set for targeting the development of a drug that, by obstructing those  
reactions of the pathogenic organism produce the metabolite that induces disease, serves to  
eliminate the deleterious, disease- causing, function of the pathogenic organism.

11. (Canceled).

12. (Withdrawn) The method according to claim 1  
wherein the reaction network analyzed is an organism producing desired bio-molecules  
of value and undesired bio-molecules of both no value; and

wherein the metabolite of interest produced by the of the undesired valueless bio-molecules;

and wherein the method further comprises:

using the reaction set to metabolically re-engineer the organism to fail of those reactions that produce the metabolite of that is undesired and valueless, therein eliminating production of undesired valueless bio-molecules while permitting production of organism is desired valued bio- molecules.

13. (Canceled).

14. (Withdrawn) The method according to claim 1

wherein the reaction network analyzed is an organism producing both desired bio-molecules of value by multiple metabolic routes; and

wherein the metabolite of interest is produced by one of the routes of the organism; and

wherein the method further comprises:

using the reaction set to metabolically re-engineer the organism to fail of those reactions that produce the metabolite of interest via the one route, therein by eliminating production of metabolite via this route, nonetheless that the metabolite is of value, leaving intact production of the same metabolite by alternative ones of the multiple metabolic routes.

Claims 15-27 (Canceled).